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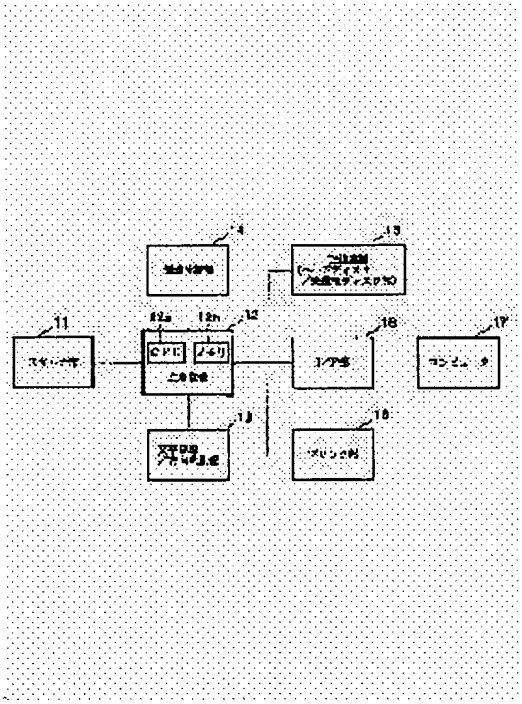
(54) METHOD AND DEVICE FOR JUDGING DIRECTION OF DOCUMENT CHARACTER RECOGNIZING DEVICE AND COMPUTER CONTROLLER

(57)Abstract:

PROBLEM TO BE SOLVED: To more accurately judge the direction of a document by discriminating the document directions of plural areas included in document picture data and determining the direction at a document picture based upon the discriminated directions of respective areas.

SOLUTION: Document picture data inputted by a scanner part 11 are separated into plural areas by an area separation part 14 and attributes are respectively applied to plural partial areas obtained by the area separation part 14. The area attributes are character areas in a text, character areas in a tables and so on. Priority is previously applied to respective attributes. A character recognizing/direction discriminating part 13 detects the direction of characters and discriminates the direction of the document in each of plural partial areas. Then, the direction of the document picture data is determined based upon the document directions of respective partial areas discriminated by the discriminating part 13 and the priority of the attributes applied to respective partial areas.



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CLAIMS

[Claim(s)]
[Claim 1] The direction judging equipment of a document characterized by providing the following. A separation means to divide inputted document image data into two or more subregions A grant means by which to any of an attribute which is two or more kinds to which a priority was given beforehand it corresponds about each of two or more of said subregions obtained with said separation means distinguishes, and it gives a distinguished attribute A distinction means to distinguish the direction of a document about each of two or more of said subregions obtained with said separation means A decision means to determine the direction of said document image data as the direction of a document of each subregion distinguished with said distinction means based on a priority of an attribute given to each subregion
[Claim 2] Said distinction means is the direction judging equipment of a document according to claim 1 characterized by making into the direction of the subregion concerned a direction where two or more alphabetic characters contained in subregion set as the object of direction distinction are extracted, character recognition is performed from two or more directions about each alphabetic character, and whenever [recognition] becomes the highest.
[Claim 3] Said decision means is the direction judging equipment of a document according to claim 1 characterized by determining the direction of a document as a direction of said document image data when a distinction result of the direction of a document in plurality of subregion which has the highest attribute of a priority is in agreement.
[Claim 4] Said two or more attributes are the direction judging equipment of a document according to claim 1 characterized by including an attribute which is an alphabetic character field for description of an attribute which is an alphabetic character field in the text, an attribute which is an alphabetic character field in a front group, an attribute which is an alphabetic character field in a title, and drawing etc.
[Claim 5] The direction judging equipment of a document according to claim 3 characterized by making into an attribute with highest priority an attribute which is an alphabetic character field in the text.
[Claim 6] The direction judging equipment of a document according to claim 3 characterized by making into an attribute with highest priority an attribute which is an alphabetic character field in a title.
[Claim 7] The direction judging equipment of a document characterized by providing the following. An extract means to extract two or more subregions from inputted document image data A distinction means to distinguish a direction about subregion extracted with said extract means A decision means to determine this direction as a direction of said document image data when the distinguished direction is in agreement about two or more subregions where it has certainty more than predetermined in said distinction means, and a direction was distinguished
[Claim 8] It is direction judging equipment according to claim 7 of a document which said extract means extracts an alphabetic character field as subregion, said distinction means performs the recognition processing from plurality about the alphabetic character contained to the extracted alphabetic character field, makes the direction where whenever [recognition] becomes the highest the direction of this alphabetic character field, and is characterized by for the certainty more than predetermined [said] to be that to which the maximum of whenever [recognition / which was acquired in said distinction means] exceeds a predetermined value.
[Claim 9] The direction judging equipment of a document characterized by providing the following. An extract means to extract two or more subregions from inputted document image data A distinction means to distinguish the direction of a document about each of two or more subregions extracted with said extract means A decision means to determine the direction of a document where a count distinguished with said distinction means about each document direction is counted, and the counted value serves as max as a direction of said document image data
[Claim 10] It is the direction judging equipment of a document according to claim 9 characterized by making a

direction where said extract means extracts two or more alphabetic character fields, said distinction means performs recognition processing from two or more directions about an alphabetic character contained to an alphabetic character field about each of an extracted alphabetic character field, and whenever [recognition] becomes the highest into the direction of this alphabetic character field.

[Claim 11] A character reader characterized by having a rotation means to rotate said document image data based on the direction of document image data judged by the direction judging equipment of a document according to claim 1 to 10, and a recognition means to perform character recognition processing using document image data which rotated with said rotation means.

[Claim 12] A direction judging method of a document characterized by providing the following. A separation production process which divides inputted document image data into two or more subregions A grant production process which to any of an attribute which is two or more kinds to which a priority was given beforehand it corresponds about each of two or more of said subregions obtained at said separation production process distinguishes, and it gives a distinguished attribute A distinction production process which distinguishes the direction of a document about each of two or more of said subregions obtained at said separation production process A decision production process which determines the direction of said document image data as the direction of a document of each subregion distinguished at said distinction production process based on a priority of an attribute given to each subregion

[Claim 13] A direction judging method of a document characterized by providing the following. An extract production process which extracts two or more subregions from inputted document image data A distinction production process which distinguishes a direction about subregion extracted at said extract production process A decision production process which determines this direction as a direction of said document image data when the distinguished direction is in agreement about two or more subregions where it has certainty more than predetermined in said distinction production process, and a direction was distinguished

[Claim 14] A direction judging method of a document characterized by providing the following. An extract production process which extracts two or more subregions from inputted document image data A distinction production process which distinguishes the direction of a document about each of two or more subregions extracted at said extract production process A decision production process which determines the direction of a document where a count distinguished at said distinction production process about each document direction is counted, and the counted value serves as max as a direction of said document image data

[Claim 15] A computer control system which reads a predetermined program from memory data medium characterized by providing the following, and controls a computer Said memory data medium is the procedure code of a separation production process which divides inputted document image data into two or more subregions. A procedure code of a grant production process which to any of an attribute which is two or more kinds to which a priority was given beforehand it corresponds about each of two or more of said subregions obtained at said separation production process distinguishes, and it gives a distinguished attribute A procedure code of a distinction production process which distinguishes the direction of a document about each of two or more of said subregions obtained at said separation production process A procedure code of a decision production process which determines the direction of said document image data as the direction of a document of each subregion distinguished at said distinction production process based on a priority of an attribute given to each subregion

[Claim 16] A computer control system which reads a predetermined program from memory data medium characterized by providing the following, and controls a computer Said memory data medium is the procedure code of an extract production process which extracts two or more subregions from inputted document image data. A procedure code of a distinction production process which distinguishes a direction about subregion extracted at said extract production process A procedure code of a decision production process which determines this direction as a direction of said document image data when the distinguished direction is in agreement about two or more subregions where it has certainty more than predetermined in said distinction production process, and a direction was distinguished

[Claim 17] A computer control system which reads a predetermined program from memory data medium characterized by providing the following, and controls a computer Said memory data medium is the procedure code of an extract production process which extracts two or more subregions from inputted document image data. A procedure code of a distinction production process which distinguishes the direction of a document about each of two or more subregions extracted at said extract production process A procedure code of a decision production process which determines the direction of a document where a count distinguished at said distinction production process

about each document direction is counted, and the counted value serves as max as a direction of said document image data

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[The technical field to which invention belongs] This invention relates to the direction judging method of a document of judging the direction of the document manuscript concerned from the image data which reads a document manuscript optically and is obtained, equipment, and the character reader equipped with this direction judging equipment of a document.
[0002]
[Description of the Prior Art] Conventionally, in character recognition processing, image data is gained using the equipment which reads a manuscript optically, and the so-called scanner, and character recognition is performed to this image data. In this case, 180 degrees rotates, and image data will output 90 degrees or a completely different code as a character recognition result, if read. Although this performs character recognition once about the gained image data, since the direction of an alphabetic character is not right, it is because a recognition result will become messy.
[0003] Then, when the direction of a document is inaccurate, people corrected the direction of read of a manuscript, it inputted again, and recognition processing has been performed, so that character recognition may be performed correctly. However, since the manuscript automatic feeding function which the speed of processing of (1) scanner improves and is called an autofeeder begins to be attached According to the reason how to place a manuscript will be uniquely decided when it is the scanner of (2) A4 with which processing a lot of manuscripts increases, and it is becoming difficult for people to amend the direction of a manuscript one by one Automatic distinction / rotation function of the direction of a document is becoming required technology.
[0004] Drawing 12 is drawing explaining the typical technique of automatic distinction of the direction of a document. In drawing 12 , by (a), the portion 1000 which has a line as shown in a table using the result of field separation is extracted, and the method which looks at the directivity and recognizes the directivity of the (using the feature currently divided into the longitudinal direction by the long line) document is shown. Moreover, as shown in (b) of drawing 12 , the projection (histogram 1001) of a lengthwise direction and a longitudinal direction is detected, and the direction of a document is distinguished from the oblong of the rectangle field 1002 which could divide, looked at condition, judged the direction (for example, let the way where the histogram is a fragment be a longitudinal direction), or carried out field separation, and matched the feature of an alphabetic character field, and the feature of being longwise.
[0005] From the distinction result of the direction of a document by the above distinction technique, the document distinguished the longitudinal direction or the lengthwise direction and was rotating the image if needed. And to the image which rotated, character recognition processing was performed and the recognition result had been obtained.
[0006] The expectation for character recognition is growing very much under the demand of wanting to arrange a lot of documents in recent years, and a character reader is carried in a electronic filing system or DTP, or is carried in a device like a copying machine which processes a document in large quantities. It becomes possible to use for retrieval the alphabetic character in the document written to paper, or to process it on DTP software with such a character reader.
[0007] As mentioned above, in a character reader, various kinds of automation technology which does not trouble human being's hand has been big technical problems. Especially the direction automatic amendment technology of a document is important indispensable technology.
[0008]
[Problem(s) to be Solved by the Invention] There is a problem as shown below in the conventional character reader

mentioned above. Namely, generating of the incorrect recognition of character recognition by having been inputted in the direction which (1) document mistook.
(2) Inconvenience at the time of checking by a monitor etc., when reading image data has turned to width or has turned to inversion.
(3) Precision of the direction distinction of a document.
(4) Precision of the direction distinction to that in which the alphabetic character of a different direction in a document is intermingled.
There is a problem to say. Easy explanation for below is performed about each above-mentioned problem.
[0009] (1) Generating drawing 13 of the incorrect recognition by the direction difference of a document is drawing showing the recognition result in each direction when the direction of read rotates to the alphabetic character "high." In addition, it is an example which drawing 13 showed to the last, and the result of incorrect recognition does not necessarily become as in drawing. As shown in drawing 13 , "**" and in the case of 180 degrees, a recognition result when the direction of read of a document rotates 270 degrees produces incorrect recognition or the result that it cannot recognize as it cannot be recognized a "character" and in the case of 90 degrees. Thus, since character recognition selects an alphabetic character candidate out of the acquired feature noting that the alphabetic character has turned to the positive direction to the last, if the direction of read rotates, it will become what also mistook the recognition result.
[0010] (2) Generating drawing 14 of the inconvenience in the case of the check of the image data on a monitor is drawing showing the condition of indicating the image data read with the scanner etc. by the display. (a) is an example of a display when the document of A4 lengthwise direction is read in every A4 length, and is a case with a normal display. (b) is the image which is rotating 90 degrees, if it is an example of a display at the time of being read by every A4 side and human being looks at the document of A4 lengthwise direction. This is generated from the relation of how (the direction of a document) the document on space is written, and the method of ** of the manuscript at the time of carrying out an image input from a scanner.
[0011] Drawing 15 is drawing explaining various kinds of arrangement conditions of the document on space. Arrangement of the document to space has various kinds of gestalten, as shown in drawing 15 . (a) is a gestalt well used by the Japanese lateral-writing document, an English document, etc. in written form every A4 length. (b) is every A4 width and is a gestalt well used by the case where a party's length carries out the contraction copy of the documents, such as a long document, a document for OHP, A3, and B4, etc. (c) is every A4 width and is a gestalt used when the column has changed in right in the middle and the contraction copy of the two A4 documents is carried out continuously. (d) is the gestalt of the columnar-writing document in every A4 length.
[0012] On the other hand, the method of a scanner of reading by the model is various. For example, the manuscript reading direction will be uniquely decided by the scanner of the flat bed which can be inputted to manuscript size maximum A4, and the scanner of the method which slides and reads A4 manuscript into a lengthwise direction. For this reason, depending on the gestalt of document arrangement, a direction will be read in the unjust direction.
[0013] Moreover, there are some which read a manuscript using the scanner section of a copying machine. The method of ** of the manuscript which should be read with such a scanner is comparatively free. Therefore, it is possible for human being to set a manuscript in the direction of the right, and to carry out an image input. In case read of a document with much manuscript number of sheets is performed especially, there is what has possible using an autofeeder, incorporating a manuscript automatically and performing read. However, when performing picking ** of a manuscript using an autofeeder, and the manuscript which is suitable in the unjust direction is mixed into the document or the manuscript with which the configuration methods of a document differ is contained, an image will be inputted in the unjust direction.
[0014] According to the above causes, the display display shown in drawing 14 will become in the strange direction. For this reason, it is necessary to rotate an image in the normal direction.
[0015] (3) The precision of direction distinction of the precision document of the direction distinction of a document must be more high. In the case of the document in which the judgment using the line of the table in a document does not have it like the above-mentioned conventional example, or the document containing the line of mixture in every direction, direction distinction may be mistaken. Moreover, when taking projection in every direction, a line and a paragraph can detect a hand of cut with a comparatively sufficient precision to the document divided firmly only in written form, but direction distinction may be mistaken when it is the document with which drawing and natural drawing are contained in the document. Furthermore, it is hard to attach 0 times, 180 degrees, 90 degrees, and 270 distinction, and the precision of direction distinction is low.

[0016] (4) Generating drawing 16 of incorrect recognition of the direction distinction in the document intermingled in the alphabetic character of a different direction is drawing showing the example of the document with which the alphabetic character of a different direction on the manuscript of one sheet is intermingled. This drawing (a) shows the case where the explanation alphabetic character to 1010 in the document with which the alphabetic character of the normal direction and a different direction exists, for example, a document, exists. moreover, the document which reduced the manuscript of two sheets and was used as the manuscript of one sheet as shown in (b) and (c) -- setting -- one side -- a **** document -- one side already has the case of horizontal ******. Direction decision results differ by whether these judge the direction of the document using the direction of which alphabetic character in a document.
[0017] This invention is made in view of the above-mentioned problem, and it aims at offering the direction judging method of a document and equipment which judge the direction of a document to accuracy more by distinguishing the direction of a document and determining the direction of the document image concerned based on the direction of each distinguished field about two or more fields included in document image data.
[0018] Moreover, it aims at judging the direction of each field to accuracy more by carrying out by distinguishing the direction of the alphabetic character contained to each field in distinction of the direction of each above-mentioned field.
[0019] Moreover, while displaying a document image in the direction of read of a document in the direction of the ****** right by having the direction judging equipment of a document offered by this invention, it aims at offering the character reader which improves character recognition precision more.
[0020]
[Means for Solving the Problem] The direction judging equipment of a document of this invention for attaining the above-mentioned purpose is equipped with the following configurations. Namely, a separation means to divide inputted document image data into two or more subregions, A grant means by which to any of an attribute which is two or more kinds to which a priority was given beforehand it corresponds about each of two or more of said subregions obtained with said separation means distinguishes, and it gives a distinguished attribute, It has a decision means to determine the direction of said document image data as a distinction means to distinguish the direction of a document, and the direction of a document of each subregion distinguished with said distinction means based on a priority of an attribute given to each subregion about each of two or more of said subregions obtained with said separation means.
[0021] Moreover, preferably, said distinction means extracts two or more alphabetic characters contained in subregion set as the object of direction distinction, performs character recognition from two or more directions about each alphabetic character, and makes a direction where whenever [recognition] becomes the highest the direction of the subregion concerned. It is because the direction of an alphabetic character can carry out the solder of the direction of a document to accuracy more by the direction of a document being shown in many cases, and detecting the direction of an alphabetic character.
[0022] Moreover, preferably, said decision means determines the direction of a document as a direction of said document image data, when a distinction result of the direction of a document in plurality of subregion which has the highest attribute of a priority is in agreement. When a direction is in agreement in two or more subregions which have a high priority to determining the direction of a document, it becomes possible to close processing of the direction distinction of a document, and effectiveness of processing improves.
[0023] Moreover, said two or more attributes include preferably an attribute which is an alphabetic character field for description of an attribute which is an alphabetic character field in the text, an attribute which is an alphabetic character field in a front group, an attribute which is an alphabetic character field in a title, and drawing etc. These alphabetic character field is classified still more finely, and an alphabetic character field which should be used for a direction judging can be chosen appropriately.
[0024] Moreover, an attribute which is an alphabetic character field in the text is preferably made into an attribute with highest priority. It is because a possibility that an alphabetic character in the text is in agreement with the direction of a document is high.
[0025] Moreover, an attribute which is an alphabetic character field in a title is preferably made into an attribute with highest priority. It is because a possibility that the direction of an alphabetic character contained to an alphabetic character field in a title is in agreement with the direction of a document is high.
[0026] Moreover, the direction judging equipment of a document of this invention which attains the above-mentioned purpose An extract means to extract two or more subregions from inputted document image data, A distinction means to distinguish a direction about subregion extracted with said extract means, When the distinguished direction is in

agreement about two or more subregions where it has certainty more than predetermined in said distinction means, and a direction was distinguished, it has a decision means to determine this direction as a direction of said document image data.

[0027] In the above-mentioned configuration, said extract means extracts an alphabetic character field as subregion preferably. Moreover, said distinction means Maximum of whenever [recognition / which performed recognition processing from plurality, made a direction where whenever / recognition / becomes the highest the direction of this alphabetic character field, and was acquired in said distinction means about an alphabetic character contained to an extracted alphabetic character field] shall have certainty beyond said predetermined value for a thing exceeding a predetermined value.

[0028] Moreover, the direction judging equipment of a document of this invention for attaining the above-mentioned purpose An extract means to extract two or more subregions from inputted document image data, It has a distinction means to distinguish the direction of a document about each of two or more subregions extracted with said extract means, and a decision means to determine the direction of a document where a count distinguished with said distinction means about each document direction is counted, and the counted value serves as max as a direction of said document image data.

[0029] Moreover, in the above-mentioned configuration, preferably, said extract means extracts two or more alphabetic character fields, and about each of an extracted alphabetic character field, said distinction means performs recognition processing from two or more directions about an alphabetic character contained to an alphabetic character field, and makes a direction where whenever [recognition] becomes the highest the direction of this alphabetic character field.

[0030] Moreover, according to this invention, said document image data is rotated based on the direction of document image data judged by the direction judging equipment of a document which has the above-mentioned configuration, and a character reader equipped with a recognition means to perform character recognition processing using document image data which rotated is offered. Since inputted document image data is rotated in the direction of the right, while being able to display a document image in the direction of a document image entry of data in ****** and the direction of the right, for example on the occasion of a display of document image data, it becomes possible to perform character recognition correctly.

[0031]

[Embodiment of the Invention] With reference to an attached drawing, the gestalt of suitable operation of hand this invention is explained below.

[0032] Direction distinction is performed in the character reader in the <operation gestalt 1> operation gestalt 1, using the recognition rate of character recognition as the technique of the direction distinction of a document. Expressing the direction of a document to accuracy most performs character recognition from a direction (0 degree, 90 degrees, 180 degrees, and 270 degrees) paying attention to being an alphabetic character field about two or more alphabetic characters in the alphabetic character field in a document, and this judges that the direction which was the highest is the direction of a right document.

[0033] By character recognition processing, an image is first cut down for every single character by the technique of the alphabetic character end out of an image. Next, election of a recognition alphabetic character selects the alphabetic character of the feature that the feature of the alphabetic character computed for every alphabetic character is nearer. The rate which shows which is close to the feature in whenever [confidence / of character recognition] (similarity) is shown. Speaking specially, showing the nearness of the distance in the feature distribution of an alphabetic character. In the case of character recognition, some kinds of near alphabetic characters are computed, and it considers as a candidate alphabetic character, but let also in it what has the nearest distance be the first candidate alphabetic character.

[0034] Although all four directions will perform character recognition if the above recognition processings are performed to four directions, the distance values (whenever [confidence]) of a candidate alphabetic character differ. The way of the alphabetic character which was suitable in the direction of the right, of course serves as a value with a near distance value. However, although a distance value is [even if] near, it is not necessarily exact. The direction of the angle of the incorrect direction may take out a good value to the character recognition from angles other than the positive direction by chance.

[0035] Therefore, two or more alphabetic characters, for example, ten characters, are extracted, direction distinction is carried out, and the distance of the nearness is calculated, and it is made a decision criterion using the average. Furthermore, in order to raise precision more, the block of an alphabetic character is chosen several places and same

processing is performed. As mentioned above, direction distinction of a document is performed using the recognition rate of character recognition. In addition, with the following operation gestalten, the following processings are performed, before carrying out direction distinction using the precision of character recognition.
[0036] Field division processing is first performed to document image data. Direction distinction processing in which character recognition processing was used is performed about the field judged to be an alphabetic character field as a result of this field division processing. As a result of obtaining the alphabetic character field used for this judgment by field division processing, that attribute is further acquired by details. For example, it is distinguished by a text area, a title field, a caption field, and the alphabetic character field in a table. By the method of this operation gestalt, priority is set up to each of these attributes and it is characterized by adopting preferentially the direction of a document judged in the high field of priority. For example, the following priority can be considered.
[0037] (1) Title priority : Among a document image, a title tends to carry out character recognition also of the character size greatly, and its a possibility that the direction is also in agreement with the direction of a right document is still higher. Therefore, the priority of a title field is set up highly.
[0038] (2) Text priority : Most text areas showing the text in a document exist among a document image. Moreover, magnitude also tends to make character recognition be a certain fixed magnitude in many cases. For this reason, the priority of a text area is set up highly.
[0039] (3) Alphabetic character un-giving priority in a table. : When a table exists among a document image and an alphabetic character exists in it, a possibility that the alphabetic character has turned to the original direction of the manuscript and a different direction is high. For this reason, priority of the alphabetic character field in a table is made low.
[0040] (4) Caption alphabetic character un-giving priority. : The field where drawing and a table exist among a document image, an explanation alphabetic character exists in the upper part, the lower part, or the transverse part in many cases, and such an alphabetic character exists is called caption field. In especially the caption field that exists in a part for the transverse part of drawing or a table, a possibility that the alphabetic character in a field has turned to the original direction of the manuscript and a different direction is high. For this reason, priority of a caption field is made low.
[0041] As mentioned above, priority is prepared in the attribute of an alphabetic character field, and the direction of a document is judged using the alphabetic character of the high alphabetic character field of priority. And according to the result of this judgment, a subject-copy image is rotated in the direction of the right, and a character recognition result and the positive direction image data are obtained. Hereafter, this operation gestalt 1 is explained to details.
[0042] Drawing 1 is a block diagram showing the configuration of the information processing system in the operation gestalt 1. These information processing system is the input section of an image, the image-processing section, the output section, and an image I/O device with external I/F. The scanner printer which consists of a configuration of the separated scanner and printer equipment, and a system like the unified copying machine are applied to this. This system is a system which is possible also for connection with a computer and can perform various actuation with the directions from a computer side through I/F.
[0043] 11 is the scanner section, reads a document manuscript optically and gains image data. Installation of the autofeeder which is an addition function is attained at the scanner section 11, and it becomes possible by equipping with this autofeeder to input the manuscript of two or more sheets continuously. 12 is the main control section and is equipped with CPU12a and memory 12b (it consists of a ROM and RAM). The main control section 12 saves image data temporarily while performing various control of the system concerned using the processing result by character recognition / direction distinction section 13, and the field separation section 14.
[0044] 13 is a block which performs distinction processing and character recognition of the direction of a document which are character recognition / direction distinction section, and is the feature of this operation gestalt. 14 is the field separation section, from document image data, divides an alphabetic character field, a graphic form field, a natural drawing field, a table field, etc. into a rectangle, and performs processing which adds the attribute of each field.
[0045] 15 is storage and saves various processing results (image data, a field separation result, character recognition result, etc.). Storage 15 consists of a hard disk, a magneto-optic disk, etc. 16 is the I/F section, is a configuration for sending data to external equipment, and has SCSI, RS232C, etc. as a gestalt of data transmission. 17 is a computer, through the I/F section 16, acquires information for data from OK and storage 15, and uses them. For example, DTP (Desktop Publishing) application is operated on a computer 17, and the document data obtained by character recognition processing is gained from storage 15, and it can constitute so that this may be used as data for edit. 18 is

the printer section and outputs the data processed using field separation information or character recognition information.

[0046] Next, actuation of this operation gestalt 1 is explained using drawing 2 - drawing 4 . Drawing 2 - drawing 4 are the flow charts showing the procedure of the character recognition in the operation gestalt 1. In addition, the control program for realizing the procedure shown with this flow chart is stored in ROM of memory 12b, and is performed by CPU12a.

[0047] First, in step S1, a manuscript is read by the scanner section 11 and document image data is obtained. The obtained document image data is stored in RAM of memory 12b. Next, in step S2, field separation processing to document image data is performed. Field separation processing is performed in inputting into the field separation section 14 the document image data stored in memory 12b. In addition, about the details of field separation processing, it mentions later. Moreover, a separation result has the rectangle information surrounding each field, and its attribute information, and is stored in a primary storage (making a note RAM of 12b). This separation result is because it is frequently accessed by CPU12a in next processing.

[0048] At step S3, direction distinction processing of the alphabetic character field which extracted the field (a text area, a title field, the alphabetic character field in a table, caption field of drawing) where the attribute was judged among each field separated by above-mentioned field separation processing to be an alphabetic character field, and was extracted in subsequent step S4 - step S16 is performed.

[0049] First, in step S4, it investigates whether an alphabetic character field and the field distinguished exist in the manuscript concerned. If an alphabetic character field does not exist in a manuscript, it progresses to step S21, and it considers as direction distinction impossible and suppose that the read direction is the direction of the right as it is (0 degree of directions).

[0050] In step S4, if an alphabetic character field exists, it will progress to step S5. At step S5, one of the fields judged to be alphabetic character fields is extracted, and processing is branched according to the attribute. That is, to step S7, if the attribute of the extracted alphabetic character field is a title field and it is a text area in step S6, if it is a caption field, processing will branch to step S8, respectively.

[0051] At step S6, the TITLE flag which shows that is memorized by making the field concerned into a title field. Moreover, at step S8, the CAPTION flag showing that is memorized by making the field concerned into a caption field.

[0052] When the field concerned is a text area, it progresses to step S9 and the text area concerned judges the thing in the text, and the thing in a table. And if it is a text area in the text, and it is a text area in a table, it will progress to step S10 to step S11, respectively. And at step S10, the TEXT flag in the text which shows that the field concerned is a text area in the text is memorized. Moreover, at step S11, the TEXT flag in a table which shows that the alphabetic character field concerned is a text area in a table is memorized.

[0053] At step S12, character recognition by the read from two or more angles is performed, and the direction of a document in the field concerned is distinguished based on the character recognition result. In addition, the details of this direction distinction of a document are mentioned later. In step S12, when the direction of a document in the field concerned is able to be distinguished, it progresses to step S14, and when distinction of the direction of a document is impossible, it progresses to step S16, respectively.

[0054] At step S14, the direction distinction result by step S12 is memorized according to each flag (namely, the inside TEXT of TITLE, CAPTION, and the text, according to inside TEX of a table). And at step S15, it judges whether the direction distinction result was in agreement in two or more alphabetic character fields judged to be the inside TEXT of the text. Supposing the coincidence direction is detectable, it progresses to step S22 by making the direction into a direction distinction result. On the other hand, when detection of the coincidence direction is not completed, it progresses to step S16, and it judges whether the above-mentioned step S5 to the step S15 was processed about all alphabetic character fields. When there is still an unsettled alphabetic character field, it progresses to step S13, the object of processing is moved to the next alphabetic character field, and it returns to step S5.

[0055] When processing of steps S5-S15 is completed about all the alphabetic character fields that could not detect the coincidence direction in the alphabetic character field judged to be a text area in the text, but were extracted at step S3, it progresses to step S17 from step S16. At step S17, it judges whether the direction distinction result was in agreement in two or more fields of the alphabetic character field judged to be a title field. Supposing the coincidence direction is detectable, this coincidence direction is made into a direction distinction result, and it progresses to step S22.

[0056] On the other hand, if the coincidence direction is undetectable in step S17, it progresses to step S18. At step

S18, it judges whether two or more direction distinction results were in agreement in the alphabetic character field judged to be a text area in a table. Supposing the coincidence direction is detectable, it progresses to step S22 by making the direction into a direction distinction result.
[0057] When the coincidence direction is not able to be detected in step S18, it progresses to step S19. At step S19, it judges whether two or more direction distinction results were in agreement in the alphabetic character field judged to be a caption field. Supposing the coincidence direction is detectable, it progresses to step S22 by making the direction into a direction distinction result.
[0058] In step S19, if the coincidence direction is undetectable, it progresses to step S20. At step S20, it investigates whether there is any field where the direction distinction result was obtained among the extracted alphabetic character fields, and if the field where at least one direction distinction result was obtained is found, it will progress to step S22 by making the direction of the field into a direction distinction result. However, investigation in step S20 is conducted in order of the text area in the text, a title field, the text area in a table, and a caption field.
[0059] When the alphabetic character field where the direction distinction result was obtained in step S20 does not exist, it progresses to step S21, and it considers as direction distinction impossible. in this case, it progresses to step S26 as an image of 0 times namely, -- as it is by making the direction of read of the scanner section 11 into the direction of a document, and processing is continued.
[0060] On the other hand, when a certain direction distinction result is obtained, the direction distinction result is acquired in step S22, and this direction distinction result judges whether it is 0 times at step S23. Since image rotation is not performed when a direction distinction result is 0 times, it progresses to step S26 as it is.
[0061] At step S24, the image data stored in memory 12b is rotated according to a direction distinction result (in this example, it becomes 90 degrees, 180 degrees, or 270 degrees). And the same field separation processing as step S2 is again performed to the image data which made a note and was stored in 12b at step S25. A field separation result is memorized by the primary storage (RAM) like the case of step S2.
[0062] At step S26, character recognition is performed over a whole sentence character field about the image data read from the image data corrected in the direction of the right, or the beginning in the direction of the right. At step S27, the character recognition result is obtained and this is stored in storage 15.
[0063] As mentioned above, with this operation gestalt 1, although it is the translation which distinguishes the direction of a document using the alphabetic character field in a document, since priority is made high and the text area in the text judged that each alphabetic character has turned to the direction of the right most into a document is used for direction distinction, the reliability of a direction judging result improves.
[0064] And when judged with the direction of a document being the direction of the right, character recognition processing is succeedingly performed to the alphabetic block in an image. On the other hand, when inputted in the unjust direction, the image data concerned is rotated in the direction of the right, field separation amendment processing is again performed to the obtained rotation image, and character recognition is performed.
[0065] Here, field separation is again performed for amending a difference of the field separation information accompanying image rotation to the image data after rotation processing. There is a method of performing field separation processing again to all the image data after (A) rotation as the method of field separation for the image after rotation or the method of applying (B) address translation to a field separation result. As for field separation processing in which field separation processing carried out to the field separation processing and the rotation image data which were performed in the first phase since the image generally assumed that it is the positive direction, results differ in many cases. So, it is common to adopt the method of (A).
[0066] And character recognition of each alphabetic character field in rotation image data is carried out by the character recognition processor (character recognition / direction distinction section 13). Consequently, even if it is the image which is not needed even if it is the image which needs rotation processing, finally field separation information and character recognition information will be acquired. Furthermore, this processing result can be transmitted to a computer 17 through the I/F section 16 of drawing 1 , and is used with the application software on a computer 17 (for example, filing processing, a document processing system, etc.).
[0067] Of course, it cannot be overemphasized that the above-mentioned processing result is transmitted to storage 15, and you may make it store it. Thus, processing transmitted to storage 15 inputs image information more nearly continuously than a scanner 11, stores the processing result in the storage Prime Minister 15, and is used for the method used in batch processing of next reading the information collectively by computer 17.
[0068] Moreover, in processing which transmits a processing result to the printer section 17, it is used by the system whose fair copy reconfigurates a document by character recognition and processing of field separation by Reverse

PDL (how to create a Page Description Language from image data), and HTML (how to describe a layout and document structure), or is made noting that the function to interpret a Page Description Language is in printer equipment.

[0069] Next, the technique of the direction distinction of a document using character recognition processing is explained.

[0070] The black pixel of [field separation processing] document image data is detected, and the rectangle frame of a black pixel block is created with a border-line trace or a labeling method. Next, the black pixel density in the rectangle, the existence of a contiguity rectangle block, the rectangular rate of an aspect ratio, etc. are made into a decision criterion, and alphabetic character fields (a title, the text, caption, etc.), a graphic form field, a natural drawing field, a table field, etc. are distinguished about each rectangle. The rectangle information on an alphabetic character field is distinguished from this processing result. This field separation processing is performed at the above-mentioned steps S2 and S25.

[0071] There are a feature-vector extract and a comparison method as the one method of [character recognition processing] character recognition processing. Drawing 5 is drawing explaining the technique of character recognition processing in which it is used with the operation gestalt 1. (a) expresses the document image of a processing object and the field 51 containing "1. the name of this invention" is extracted as an alphabetic character field. As the 1st step of character recognition processing, as shown in (b), logging processing of an alphabetic character is performed. This is the processing which starts the rectangle of one alphabetic character, and if the condition of a black pixel continuity is detected, it will be called for.

[0072] Next, as the 2nd step, as shown in (c), the rectangle of a single character is divided into the block (for example, block of 64x64) of mxn. And the distribution direction of a black pixel is extracted from the inside using the window of 3x3 (direction vector information). (d) is an example which shows the direction vector information. This window is shifted and direction vector information is acquired dozens of pieces. This vector information serves as the feature of an alphabetic character.

[0073] This feature vector is compared with the character recognition dictionary in which the feature vector beforehand standard about each alphabetic character is registered, and both extract an alphabetic character in an order from the nearest alphabetic character. It becomes the first candidate, and the nearest alphabetic character is continuously set to the second and the third. The nearness of these both feature vector becomes a numeric value of whenever [nearness / to that alphabetic character / of distance /, and above-mentioned confidence].

[0074] The [direction distinction of an alphabetic character] Although it is the translation in which whenever [confidence / of an alphabetic character] can be found in above-mentioned character recognition processing, the procedure of searching for the direction of a document using this character recognition processing is explained using drawing 6 . Drawing 6 is drawing explaining the detection method of the direction of a document in the operation gestalt 1. The sentence which (a) rotated in the sentence of the positive direction and (b) rotated at 270 degrees is shown. If a "book" is observed here, as shown in (c), character recognition will be performed from the direction of 0 times, 90 degrees, 180 degrees, and 270 degrees. It can realize by changing the method of a readout of the image data from the field of an alphabetic character rectangle, and the recognition processing by each angle does not need to rotate especially subject-copy image data. Now, if the character recognition result ((c)) by each angle is seen, recognition alphabetic characters differ at each angle. In addition, the recognition result shown in (c) is whenever [temporary character recognition result / for explanation /, and confidence].

[0075] According to (c), according to the recognition result in the alphabetic character of the positive direction, it is recognized as a "book" and also whenever [confidence] serves as 0.90 and a high value. If it rotates 90 degrees, it will be recognized as a "town" and whenever [confidence] will fall with 0.40. This is for having taken out the near alphabetic character of the feature forcibly from the feature of the alphabetic character which was suitable in the unjust direction. A value also with the low value of 180 degrees and 270 degrees is shown similarly. Whenever [this confidence] becomes more remarkable [a more complicated alphabetic character / that difference].

[0076] According to the result of (c) of drawing 6 , it is judged that a possibility of a document of having turned to the positive direction is high. In order to raise precision more, still more nearly same processing about some alphabetic characters is performed. Only by one alphabetic block, since it may become special, it is necessary to carry out also about a different alphabetic character field.

[0077] Since it becomes a value with the high value of a revolving direction, a direction can be distinguished from the average of whenever [from each angle / confidence]. At 0 times, 180 degrees, 90 degrees, and 270 degrees, since whenever [confidence] differ, respectively, the sense of four directions will be known. This obtains a direction

distinction result with a high precision.
[0078] next, it should rotate -- ** -- if judged, a subject-copy image will be rotated. Since this is attained by well-known technique using CPU12a in the main control section 12 of drawing 1 , and memory 12b, detailed explanation is omitted.
[0079] [Information [which is finally acquired] (step S27)] drawing 7 is drawing explaining the data gained when final character recognition is finished. By processing as shown in the above figure, subject-copy image data (A), field separation data (B), and an OCR result (character recognition result) (C) can be obtained about the image with which the direction of a document was finally amended.
[0080] The subject-copy image data of (A) is image data after the rotation to which the direction of read was corrected in the direction of the right. In the field separation data of (B), "header" shows that subsequent data is field separation data. "rect1" - "rectn" is field separation data to the field detected, respectively. "rect1" - "rectn" has structure as shown in 71, respectively. That is, it consists of each data showing "w, h" showing "order" which shows the number for pinpointing a field, "att" which shows the attribute of a field, "x1, y1" which show the location (angle at the upper left of rectangular) of a field, the width of face of a field, and height, and the direction of a group of the field concerned (columnar writing, lateral writing) of "direction."
[0081] Moreover, character recognition information serves as a gestalt as shown in (C), and each data of "OCR1" - "OCRn" is as a result of [of each field of "rect1" - "rectn"] character recognition. A character recognition result has the data structure shown in 73, respectively. Moreover, blk header is a header added before the character recognition result of each field, and puts in the information on about what kind of rectangle field character recognition processing was carried out. This blk headr has "type", "order", "att", "x1", "y1", "w", "h", and "direction." "order" Each data of - "direction" is the same as each data of the above-mentioned field separation data 71. "type" shows that subsequent data is blk header. Moreover, distinction of Japanese, English, other language, etc. is also shown about a character recognition result.
[0082] "type" in the character recognition result 73 is the same as "type" of blk header except for the point that it is shown that subsequent data is as a result of character recognition. Moreover, "an alphabetic character 1" etc. is a character code as a recognition result. furthermore, in the character recognition result 73, "x1", "y1", "w", and "h" are the alphabetic character rectangle information at the time of carrying out single-character end appearance. Furthermore, "reserve" shows the reserve section. The above information is used by application. For example, it is used by the electronic filing system, document plastic surgery, DTP, etc.
[0083] Although the attribute of the alphabetic character field in a document is made into the item of priority and priority is most made high for the text in the text with the above-mentioned operation gestalt 1, a setup of priority is not restricted to this. For example, priority of a title field may be made the highest noting that the probability for the title field to have turned to the positive direction most is high.
[0084] In the procedure of the operation gestalt 1, the priority of a direction judging is determined by of which attribute the field is referred to in steps S15, S17-S19 of drawing 3 . And as for the field referred to with a young step number, priority becomes high. Therefore, the priority in a direction judging can be changed by changing the attribute of the field referred to in these steps. Drawing 8 is a flow chart explaining the character recognition procedure at the time of making a title field into the field of the highest priority. In addition, the procedure shown by drawing 8 was equivalent to the procedure shown by drawing 3 , and gave the same step number to the step which performs the same processing. The attribute of the field referred to at steps S15 and S17 is replaced, and modification of priority is attained by step S15' and considering as S17' so that clearly from contrast of drawing 8 and drawing 3 .
[0085] Moreover, although the attribute of the caption field which attached to the sides, such as drawing in a document and a table, and was written to reverse was made into the lowest priority, it is also clear that the alphabetic character field in a table can be made into the field where priority is the lowest noting that a possibility that it is suitable in the direction where the alphabetic character field in a table is stranger is high.
[0086] With the <operation gestalt 2> above-mentioned implementation gestalt 1, priority is given to the attribute of an alphabetic character field and the direction of a document is judged, using preferentially the direction of a document judged from the alphabetic character field which has the high attribute of priority. With this operation gestalt 2, when this judgment result is in agreement in two or more alphabetic character fields using the high judgment result of whenever [confidence] in the direction judging of an alphabetic character field, that direction is determined as a direction of a document.
[0087] According to the operation gestalt 2, to document image data, field division processing is performed and direction distinction processing in which character recognition processing was used is performed about the field

judged to be an alphabetic character field as a result of this field division processing. And if the result of the direction distinction with whenever [above confidence] is obtained to some extent in an alphabetic character field, let it be the 1st candidate's direction recognition result. A direction judging is succeedingly performed about other alphabetic character fields, and if the result of the direction distinction with whenever [beyond a predetermined value / confidence] is obtained, let it be the 2nd candidate's direction recognition result.
[0088] If the 1st and 2nd candidates' direction recognition result obtained as mentioned above is in agreement, the direction will be judged to be the direction of the document concerned.
[0089] In addition, since the structure of a system in the operation gestalt 2 is the same as that of operation gestalt 18 drawing 1 , explanation is omitted.
[0090] Drawing 9 and drawing 10 are the flow charts showing the procedure of the character recognition processing in the operation gestalt 2. At step S41, an image is optically read by the scanner section 11, and image data is obtained. At step S42, field separation processing in which it explained with the operation gestalt 1 to the obtained image data is performed. And an alphabetic character field is extracted from the field separated at step S43.
[0091] At step S44, the direction of a document is distinguished about one of the extracted alphabetic character fields. The distinction method of the direction of a document is as the operation gestalt 1 having explained. Here, if the direction of an alphabetic character of the alphabetic character field concerned cannot be distinguished, it progresses to step S45, and it judges whether there is any following unsettled alphabetic block. If there is an unsettled alphabetic block, it will return to step S44. On the other hand, if an unsettled alphabetic block is lost in step S45, distinction of a hand of cut will progress to step S54 as it is noting that it is impossible. In addition, whether the judgment result which has whenever [predetermined confidence] was obtained performs propriety of distinction of the direction of a document in step S44. Therefore, the small judgment result of whenever [confidence] is eliminated by making whenever [this confidence] into a to some extent high value.
[0092] At step S46, the result of the direction distinction of a document of step S44 is saved as the 1st distinction direction. That is, in processing of steps S44 and S45, when the distinction result of the direction of a document which has whenever [beyond a predetermined value / confidence] is obtained, the distinction direction is saved as the 1st distinction direction.
[0093] Then, in step S47 - step S49, the same processing as step S44 - step S46 is performed, and if the distinction result of the direction of a document which has whenever [beyond a predetermined value / confidence] is obtained, this is saved as the 2nd distinction direction.
[0094] In step S49, conservation of the 2nd distinction direction judges whether the 2nd distinction direction is the same as the 1st distinction direction in step S50. If both the distinction direction is the same, it will progress to step S51 and processing will be branched by what times those distinction directions are. In step S51, if the distinction direction is 0 times, since processing of image rotation etc. is unnecessary, it progresses to step S54 and character recognition processing is performed as it is.
[0095] On the other hand, based on the distinction direction detected by progressing to step S52, if it is either whose distinction directions are 90 degrees, 270 degrees, and 360 degrees in step S51, an image will be rotated so that the image concerned may turn to the direction of the right. And in step S53, it progresses to step S54 in order to perform field separation again in the image data after rotation and to perform character recognition about a whole sentence character.
[0096] Moreover, in step S47, if the alphabetic character field which should be processed before the 2nd distinction direction is detected is lost, the 1st distinction direction saved at step S46 will be adopted as a direction of the document image concerned, and it will progress to step S51 as it is.
[0097] Moreover, in step S50, if both the distinction direction is not in agreement, distinction of the direction of a document progresses to step S54 as impossible (that is, recognition processing of a whole sentence character is performed, without performing rotation of an image etc.).
[0098] At step S54, character recognition is performed about the whole sentence character field in image data. And in step S54, field separation information and character recognition information as shown by drawing 7 are generated.
[0099] As mentioned above, in the above-mentioned operation gestalt 2, as the check of the propriety of the distinction in distinction of the direction of a document is performed by whether it has whenever [beyond a predetermined value / confidence] and the small distinction result of whenever [confidence] is not adopted, the precision of direction distinction is improved. Moreover, the precision of the Mukai distinction is further improved by referring to two or more direction distinction results.
[0100] With the above-mentioned operation gestalt 1, if two document fields where the direction distinction result

which has whenever [beyond the predetermined value in a document / confidence] was obtained are detected and the direction distinction result of these document fields is in agreement, this will be gained as a direction distinction result. However, it is also possible to constitute so that it may judge by whether the distinction direction is in agreement in three or more alphabetic character fields.

[0101] Moreover, he determines the direction of a document by coincidence of the 1st distinction direction detected first and the 2nd distinction direction, and is trying not to run in time amount to the processing for direction distinction to the indefinite document of such a direction with the above-mentioned operation gestalt 2. However, when the 1st and 2nd distinction direction is not in agreement at step S50, processing may be returned to step S44, and you may constitute so that direction detection may be redone using other alphabetic character fields. What is necessary is just to determine that direction as a direction of a document, when in agreement with the 1st distinction direction are above-mentioned [a direction] in the direction, or the 2nd distinction direction detected by other alphabetic character fields at this time.

[0102] With the <operation gestalt 3> book operation gestalt 3, the direction judging of a whole sentence character field is performed to direction distinction, it has a direction with many counts of distinction, and how to determine in the direction of the document concerned is explained.

[0103] Drawing 11 is a flow chart showing the procedure of the character recognition processing in the operation gestalt 3. In this drawing, step S61 - step S63 perform the same processing as step S41 of drawing 9 - step S43. At step S64, direction distinction is performed about one of the alphabetic character fields extracted at step S63. And if the direction which has whenever [beyond a predetermined value / confidence] is distinguished as a result, it will progress to step S65. At step S65, the count of distinction is counted for every direction distinguished at step S64. The counted value of the count of distinction makes a note, and prepares and stores a predetermined field in RAM of 12b. And it progresses to step S66.

[0104] On the other hand, when the direction judging which has whenever [beyond a predetermined value / confidence] is not able to be performed at step S64, it progresses to step S66 as it is. At step S66, it judges whether the next unsettled alphabetic character field exists, and if there is an unsettled alphabetic character field, it will return to step S64. Moreover, if an unsettled alphabetic character field is lost, it will progress to step S67. Direction distinction is performed about all alphabetic character fields as mentioned above, and the count distinguished by having counts whenever [beyond a predetermined value / confidence] for every (this example 0 times, 90 degrees, 180 degrees, 270 degrees) direction.

[0105] At step S67, the direction where the count of distinction became max is detected, and this is determined as a direction of the document concerned. It progresses to step S51 by making into a distinction result the direction determined as mentioned above. In addition, since step S51 - step S55 are the same as each step shown by drawing 10 , explanation is omitted here.

[0106] Since a direction with many counts which performed the direction judging and were most judged about the whole alphabetic character field is made into the direction of a document according to the operation gestalt 3 as explained above, the direction of a document can be judged with a sufficient precision.

[0107] Since the direction of the document is judged by inspecting two or more alphabetic character fields in a document as mentioned above according to each operation gestalt, it becomes possible to obtain the high distinction result of precision more. For this reason, even if a document input is performed in the direction which the direction of a document mistook, in the system which files the document which became possible [amending automatically], especially was inputted in large quantities, it is effective in the ability to save human being's time and effort. Also in character recognition processing, while it is lost that character recognition is carried out with the wrong direction and being able to prevent incorrect recognition, image data is also saved in the direction of the right.

[0108] The direction distinction of a document and character recognition processing in the above-mentioned information processing system are realizable also in the configuration which connected the scanner to the personal computer etc. Therefore, the storage which made the program of the above-mentioned example memorize can also attain the purpose of this invention attained by the function of the above-mentioned equipment, or the function of a method. That is, it is because the program itself which equipped the above-mentioned equipment with the storage, and was read from the storage to it attains the new function of this invention. In addition, from a nest and this floppy disk, to read a control program as some storage 15, to make a note of a storage, to store a floppy disk, then a floppy disk driver in 12b for it, and what is necessary is just made to perform this by CPU12a.

[0109] The program structure-feature for this concerning this invention is as being shown in drawing 17 .

[0110] In (a) of drawing 17 , 1701 is separation processing and divides the inputted document image data into two or

more subregions. Moreover, 1702 is grant processing, and to any of the attribute which is two or more kinds to which the priority was given beforehand it corresponds about each of two or more subregions obtained by the above-mentioned separation processing 1701 distinguishes it, and it gives the distinguished attribute. The above processing is processing equivalent to step S2 of drawing 2 .

[0111] Moreover, 1703 is distinction processing and distinguishes the direction of a document about each of two or more of said subregions obtained by the above-mentioned separation processing 1701. This is processing equivalent to step S12 of drawing 3 . And 1704 is decision processing and determines the direction of the document image data concerned as the direction of a document of each subregion distinguished by the distinction processing 1703 based on the priority of the attribute given to each subregion. This is equivalent to step S15 of drawing 3 - step S20.

[0112] (b) of drawing 17 is drawing which a note is made at the time of storing the program module for performing each above-mentioned processing in a storage, and expresses a map. separation -- processing -- a module -- 1701 -- ' -- grant -- processing -- a module -- 1702 -- ' -- distinction -- processing -- a module -- 1703 -- ' -- decision -- processing -- a module -- 1704 -- ' -- respectively -- separation -- processing -- 1701 -- grant -- processing -- 1702 -- distinction -- processing -- 1703 -- decision -- processing -- 1704 -- performing -- a program module -- it is .

[0113] Moreover, drawing 18 is drawing explaining other programs concerning this invention. In (a) of drawing 18 , 1801 is extract processing and extracts two or more subregions from the inputted document image data. This is processing equivalent to steps S41-S43 of drawing 9 . 1802 is distinction processing and distinguishes a direction about the subregion extracted by the extract processing 1801. This is processing equivalent to steps S44 and S47 of drawing 9 . 1803 is decision processing, and when the distinguished direction is in agreement about two or more subregions where it has the certainty more than predetermined in the distinction processing 1802, and the direction was distinguished, it determines this direction as a direction of said document image data. This is processing equivalent to steps S46 and S49 of drawing 9 , and step S50 of drawing 10 .

[0114] (b) of drawing 18 is drawing which a note is made at the time of storing the program module for performing each above-mentioned processing in a storage, and expresses a map. separation -- processing -- a module -- 1801 -- ' -- distinction -- processing -- a module -- 1802 -- ' -- decision -- processing -- a module -- 1803 -- ' -- respectively -- separation -- processing -- 1801 -- distinction -- processing -- 1802 -- decision -- processing -- 1803 -- performing -- a program module -- it is .

[0115] Moreover, drawing 19 is drawing explaining the program of further others concerning this invention. In (a) of drawing 19 , 1901 is extract processing and extracts two or more subregions from the inputted document image data. This is equivalent to processing of steps S61-S63 of drawing 11 . Moreover, 1902 is distinction processing and distinguishes the direction of a document about each of two or more subregions extracted at the above-mentioned extract production process 1901. This is equivalent to processing of step S64. Moreover, 1903 is decision processing, counts the count distinguished by the above-mentioned distinction processing 1902 about each document direction, and determines the direction of a document where the counted value serves as max as a direction of said document image data. This is equivalent to steps S65 and S67.

[0116] Moreover, even if it applies this invention to the system which consists of two or more devices, it may be applied to the equipment which consists of one device. Moreover, it cannot be overemphasized that this invention can be applied also when attained by supplying a program to a system or equipment. In this case, the storage which stored the program concerning this invention will constitute this invention. And the system or equipment operates by the method defined beforehand by reading the program from this storage to a system or equipment.

[0117]

[Effect of the Invention] As mentioned above, according to this invention, the direction of a document is distinguished about two or more fields included in document image data, it becomes possible to determine the direction of the document image concerned based on the direction of each distinguished field, and the direction of a document can be judged more to accuracy.

[0118] Moreover, according to this invention, it becomes possible to judge the direction of each field to accuracy more by carrying out by distinguishing the direction of the alphabetic character contained to each field in distinction of the direction of each subregion.

[0119] Moreover, according to this invention, a document image is displayed in the direction of read of a document in the direction of the ****** right, and character recognition precision improves more.

[0120]

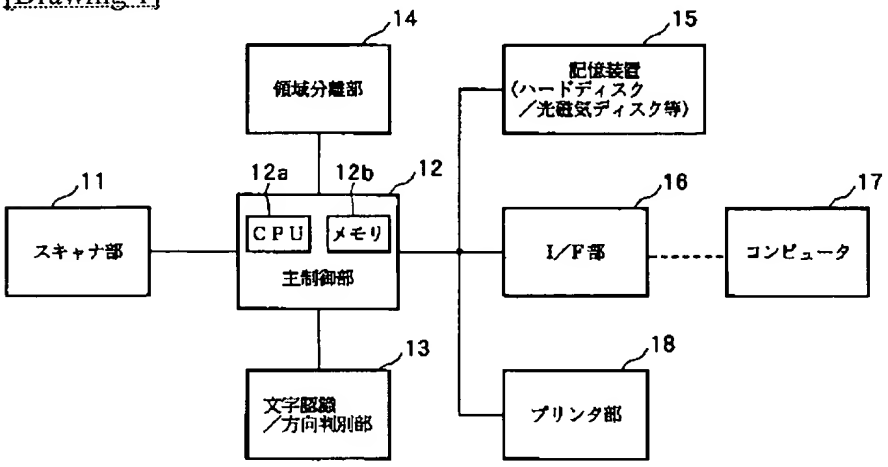
[Translation done.]

* NOTICES *

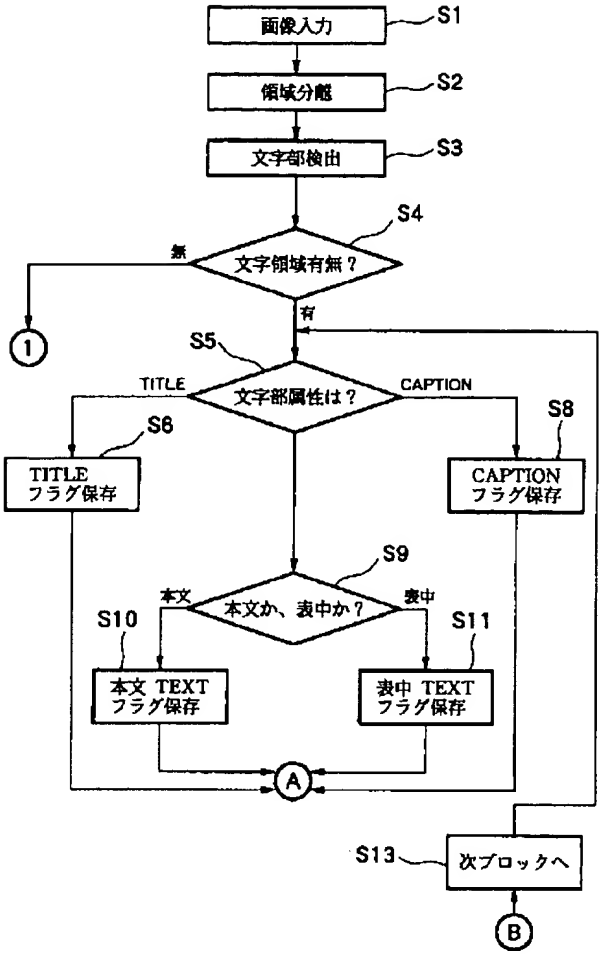
1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DRAWINGS

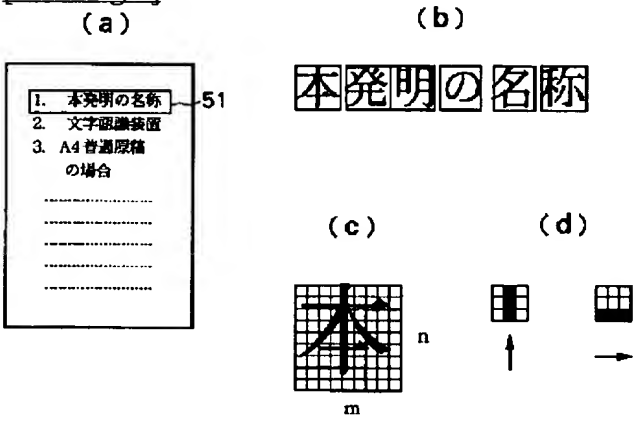
[Drawing 1]



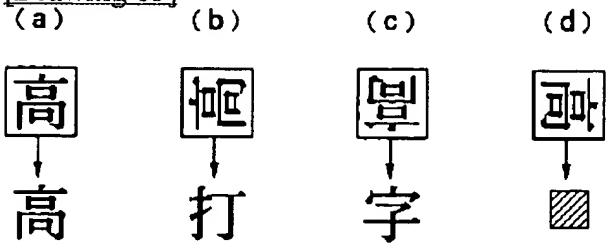
[Drawing 2]



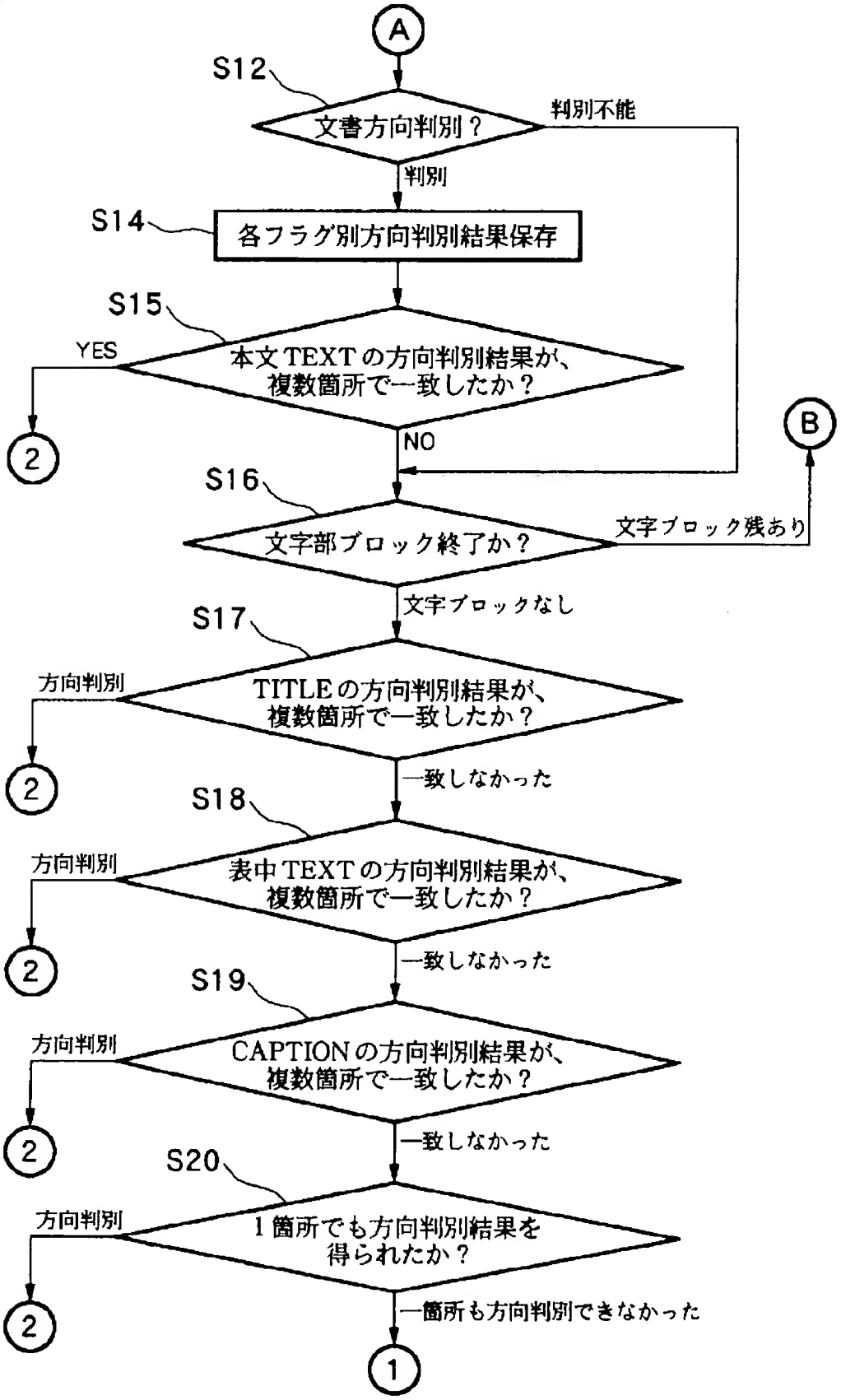
[Drawing 5]



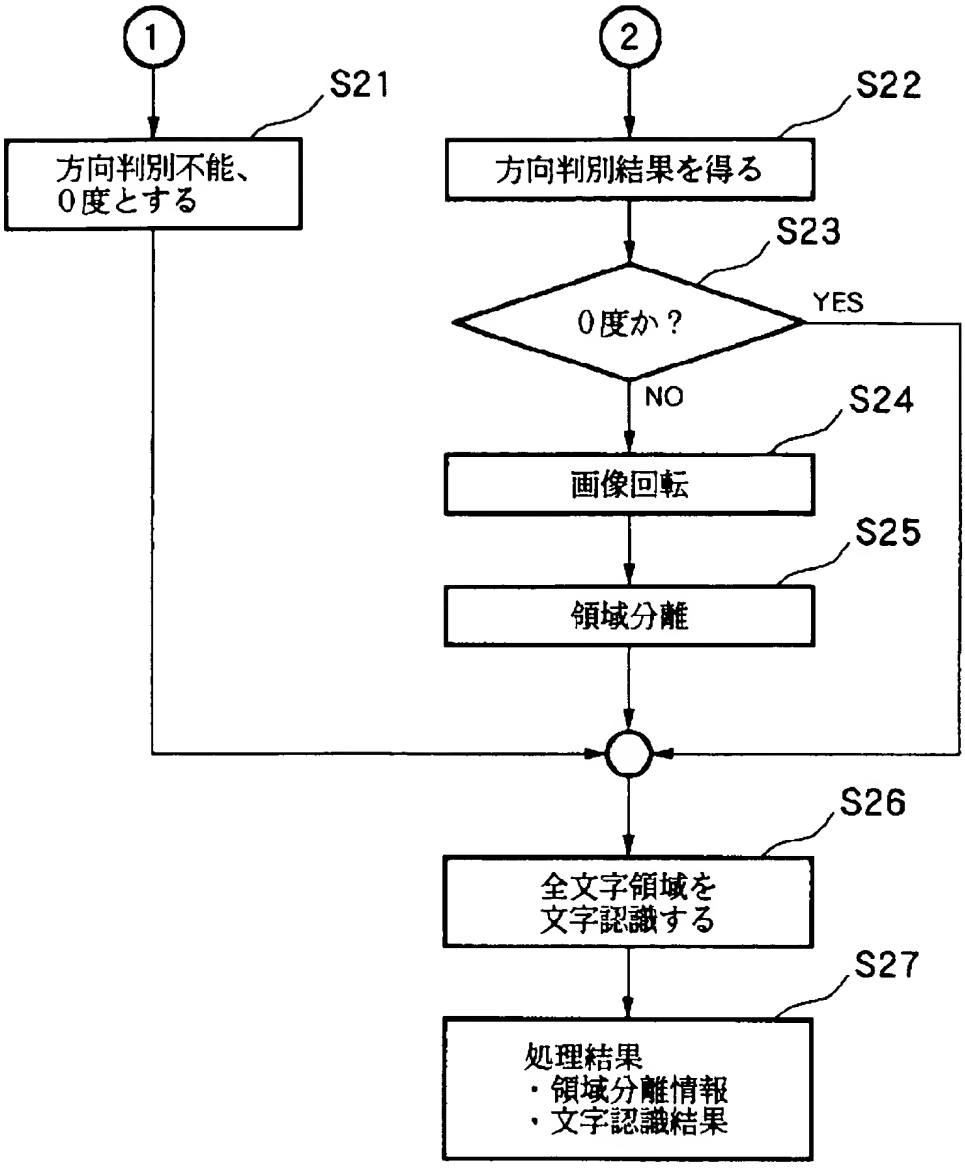
[Drawing 13]



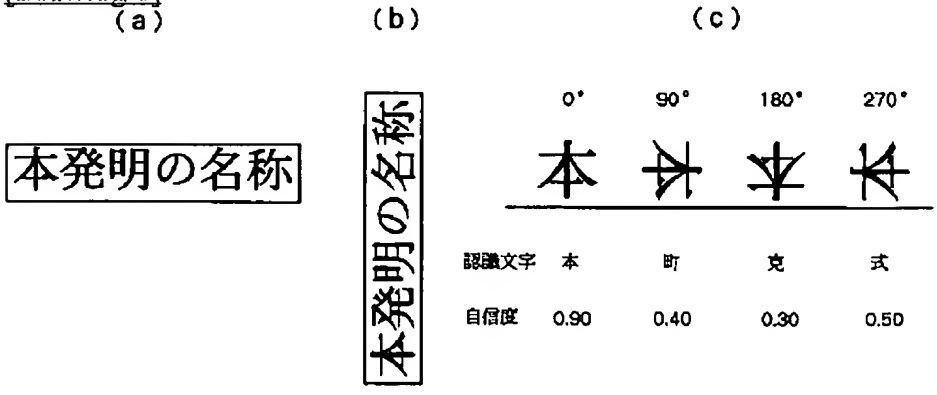
[Drawing 3]


A
S12
文書方向判別？
判別不能
判別
S14
各フラグ別方向判別結果保存
S15
本文TEXTの方向判別結果が、
複数箇所で一致したか？
YES
NO
2
B
S16
文字部ブロック終了か？
文字ブロック残あり
文字ブロックなし
S17
TITLEの方向判別結果が、
複数箇所で一致したか？
方向判別
一致しなかった
S18
表中TEXTの方向判別結果が、
複数箇所で一致したか？
方向判別
一致しなかった
S19
CAPTIONの方向判別結果が、
複数箇所で一致したか？
方向判別
一致しなかった
S20
1箇所でも方向判別結果を
得られたか？
方向判別
一箇所も方向判別できなかった
1

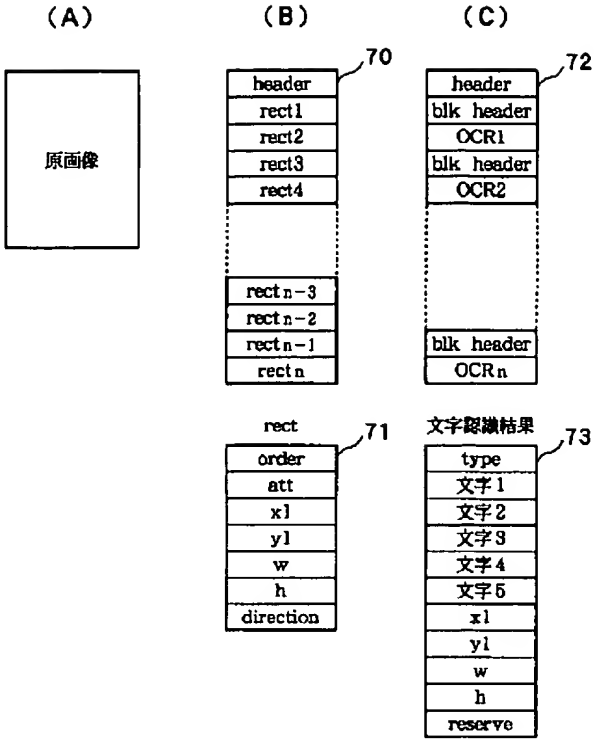
[Drawing 4]



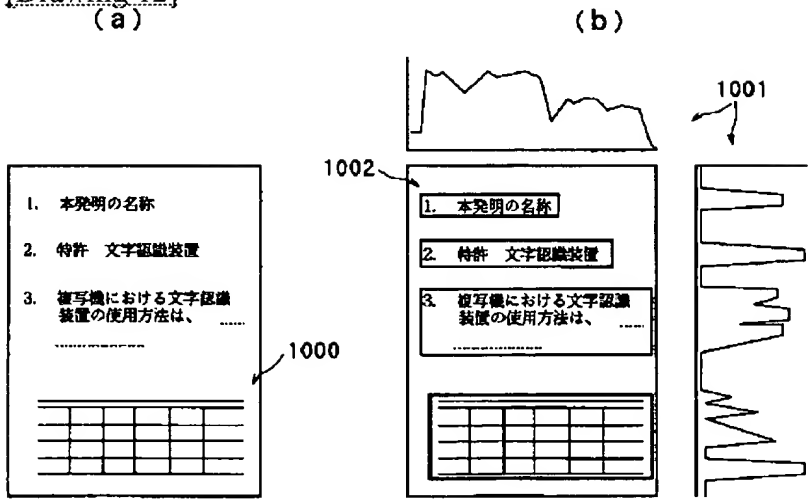
[Drawing 6]



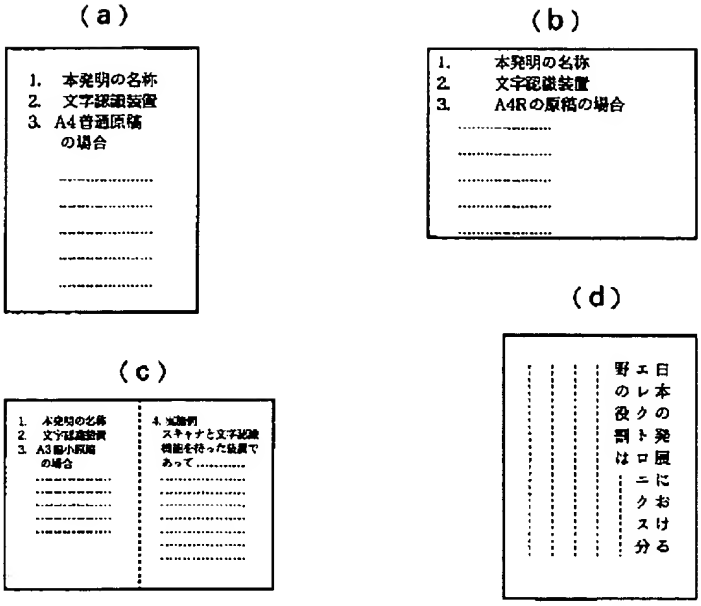
[Drawing 7]



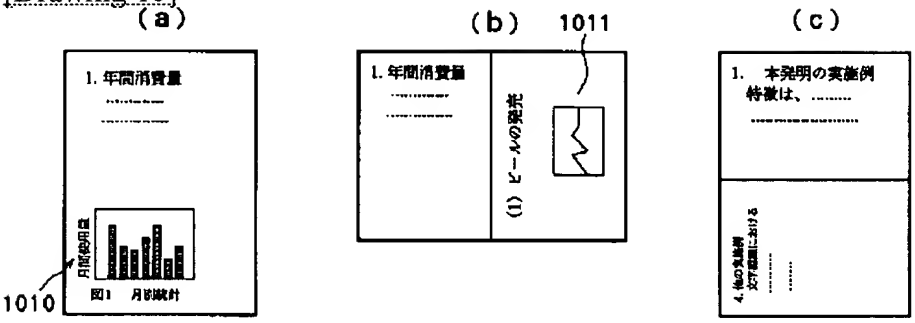
[Drawing 12]



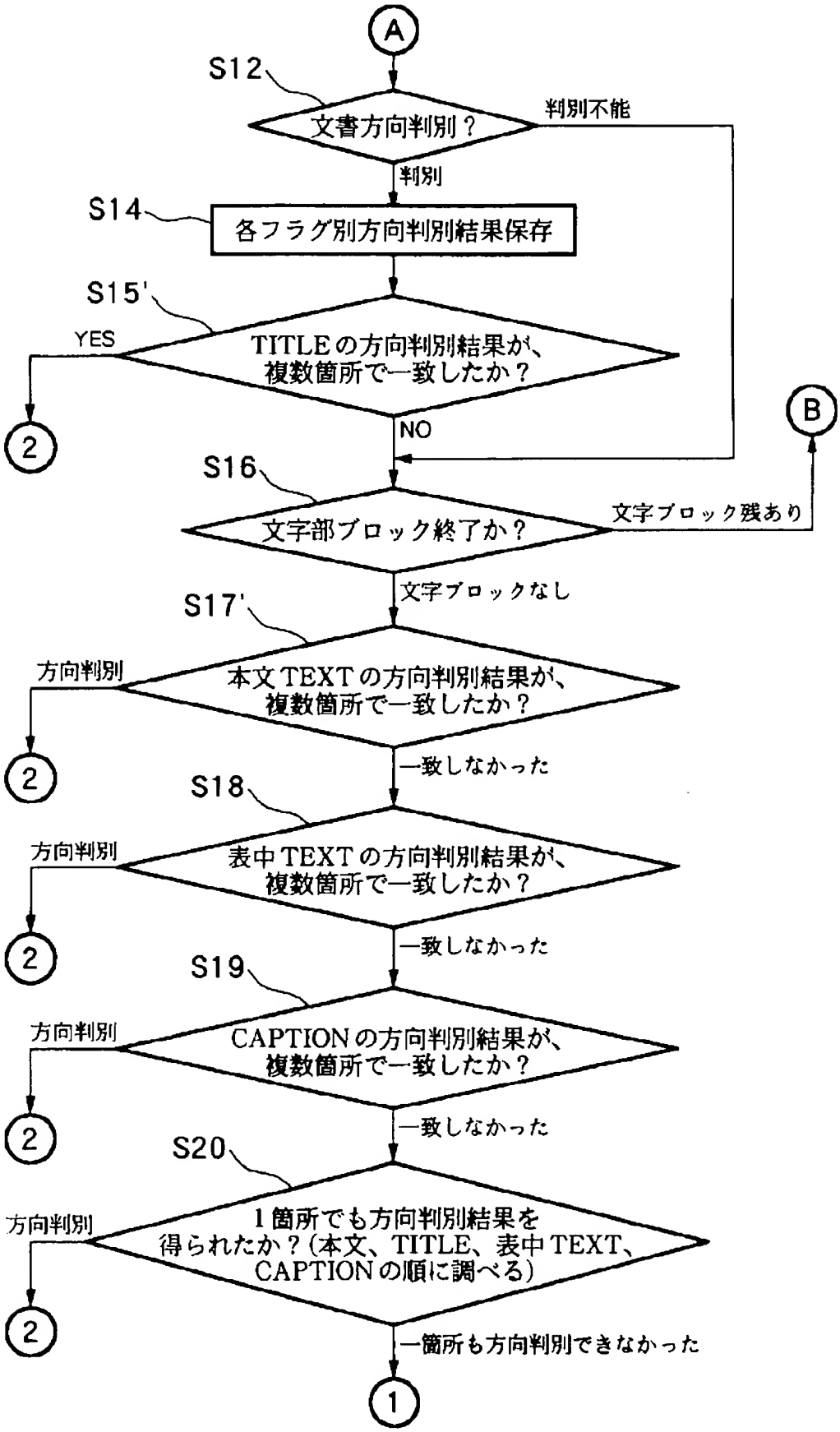
[Drawing 15]



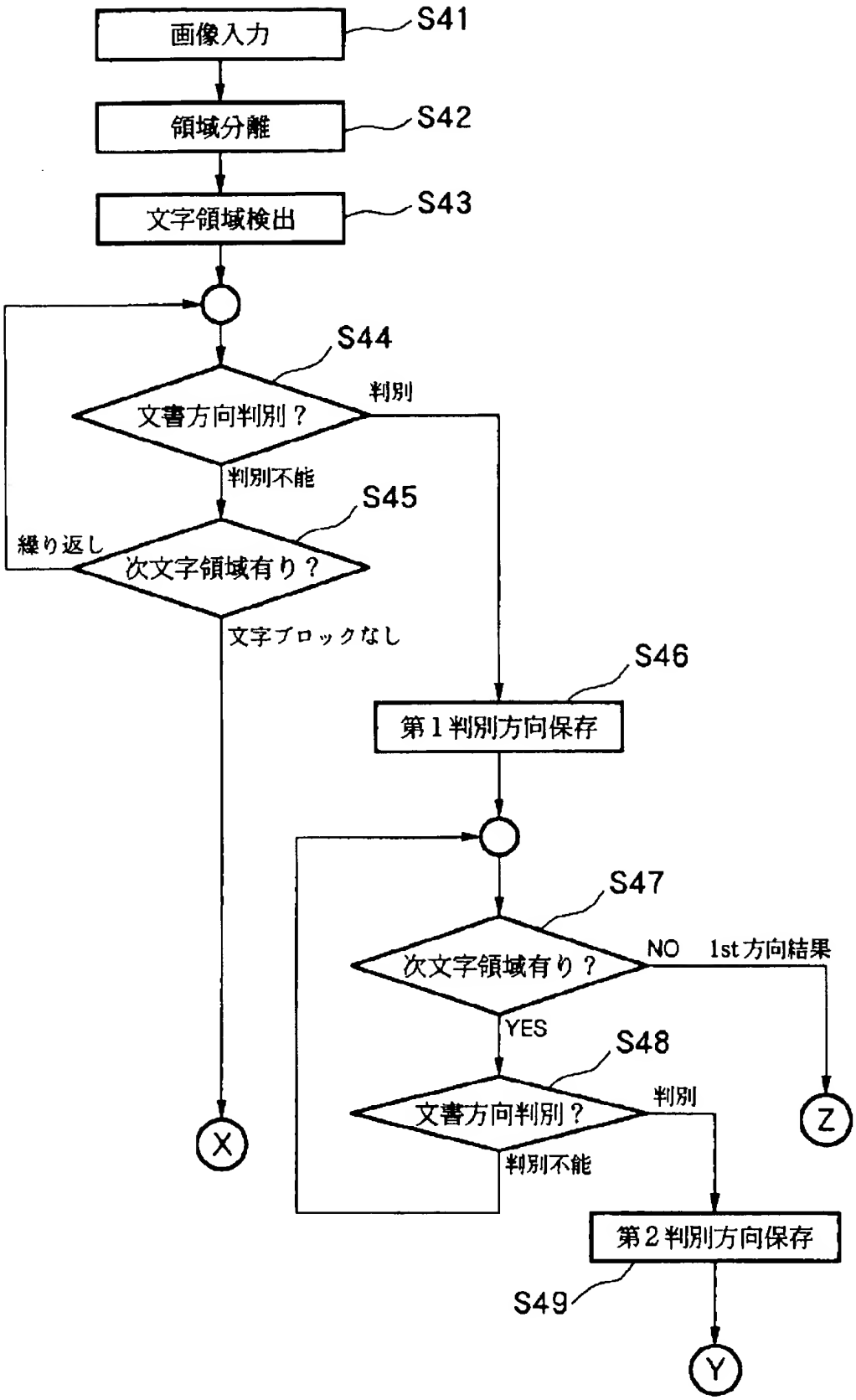
[Drawing 16]



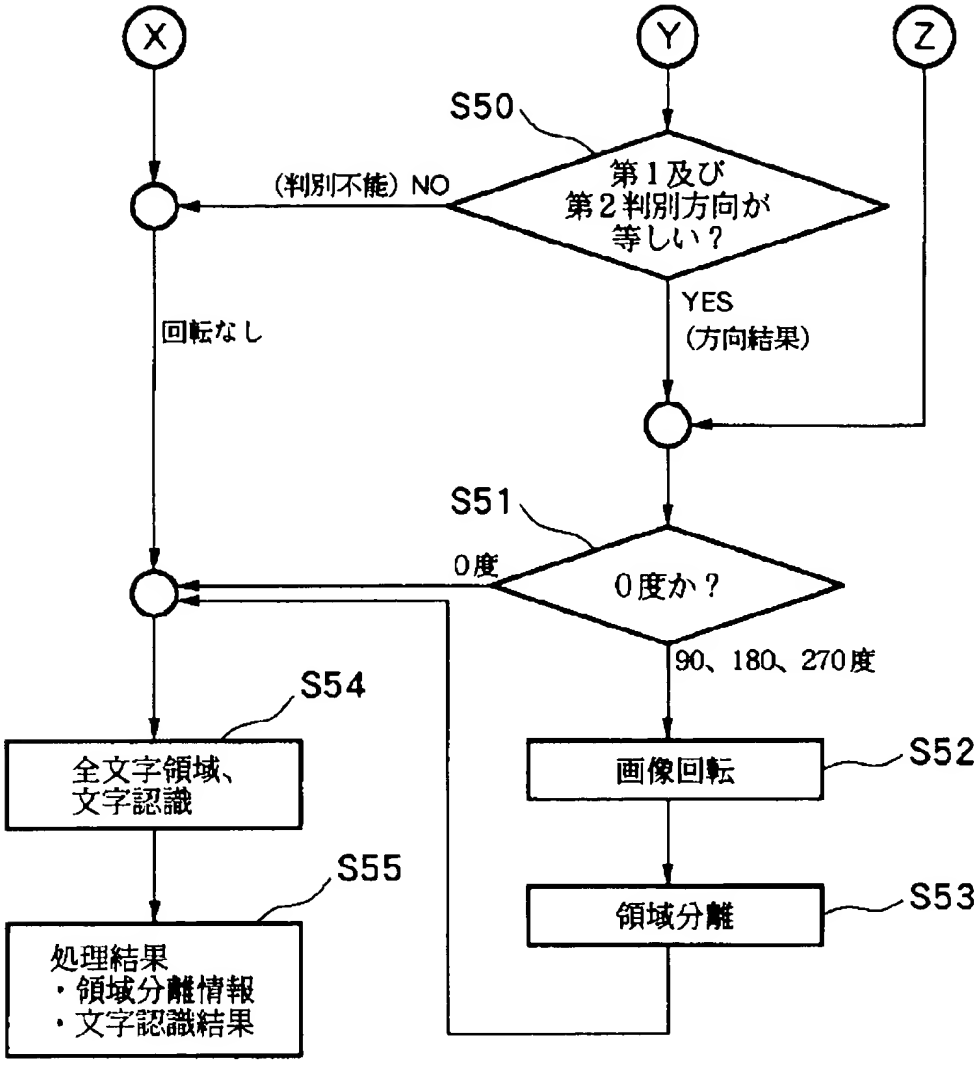
[Drawing 8]


A
S12
文書方向判別？
判別不能
判別
S14
各フラグ別方向判別結果保存
S15'
YES
TITLEの方向判別結果が、
複数箇所で一致したか？
NO
B
2
S16
文字部ブロック終了か？
文字ブロック残あり
文字ブロックなし
S17'
方向判別
本文TEXTの方向判別結果が、
複数箇所で一致したか？
一致しなかった
S18
方向判別
表中TEXTの方向判別結果が、
複数箇所で一致したか？
一致しなかった
S19
方向判別
CAPTIONの方向判別結果が、
複数箇所で一致したか？
一致しなかった
S20
方向判別
1箇所でも方向判別結果を
得られたか？(本文、TITLE、表中TEXT、
CAPTIONの順に調べる)
一箇所も方向判別できなかった
1

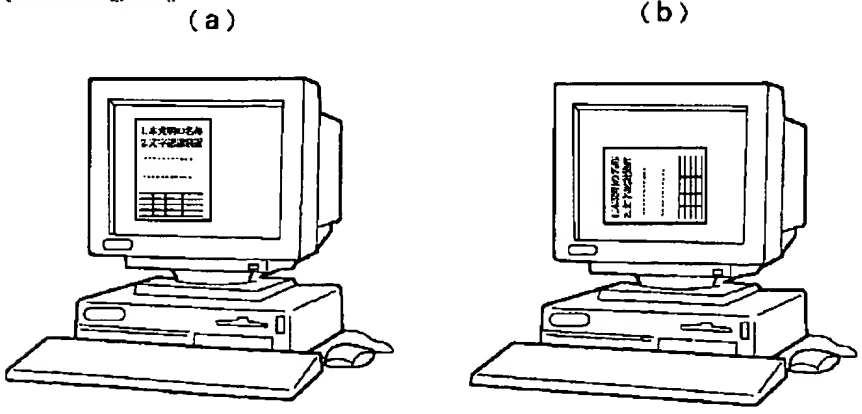
[Drawing 9]


画像入力
S41
領域分離
S42
文字領域検出
S43
S44
文書方向判別？
判別
判別不能
S45
繰り返し
次文字領域有り？
文字ブロックなし
X
S46
第1判別方向保存
S47
次文字領域有り？
NO
1st方向結果
YES
S48
文書方向判別？
判別
判別不能
Z
第2判別方向保存
S49
Y

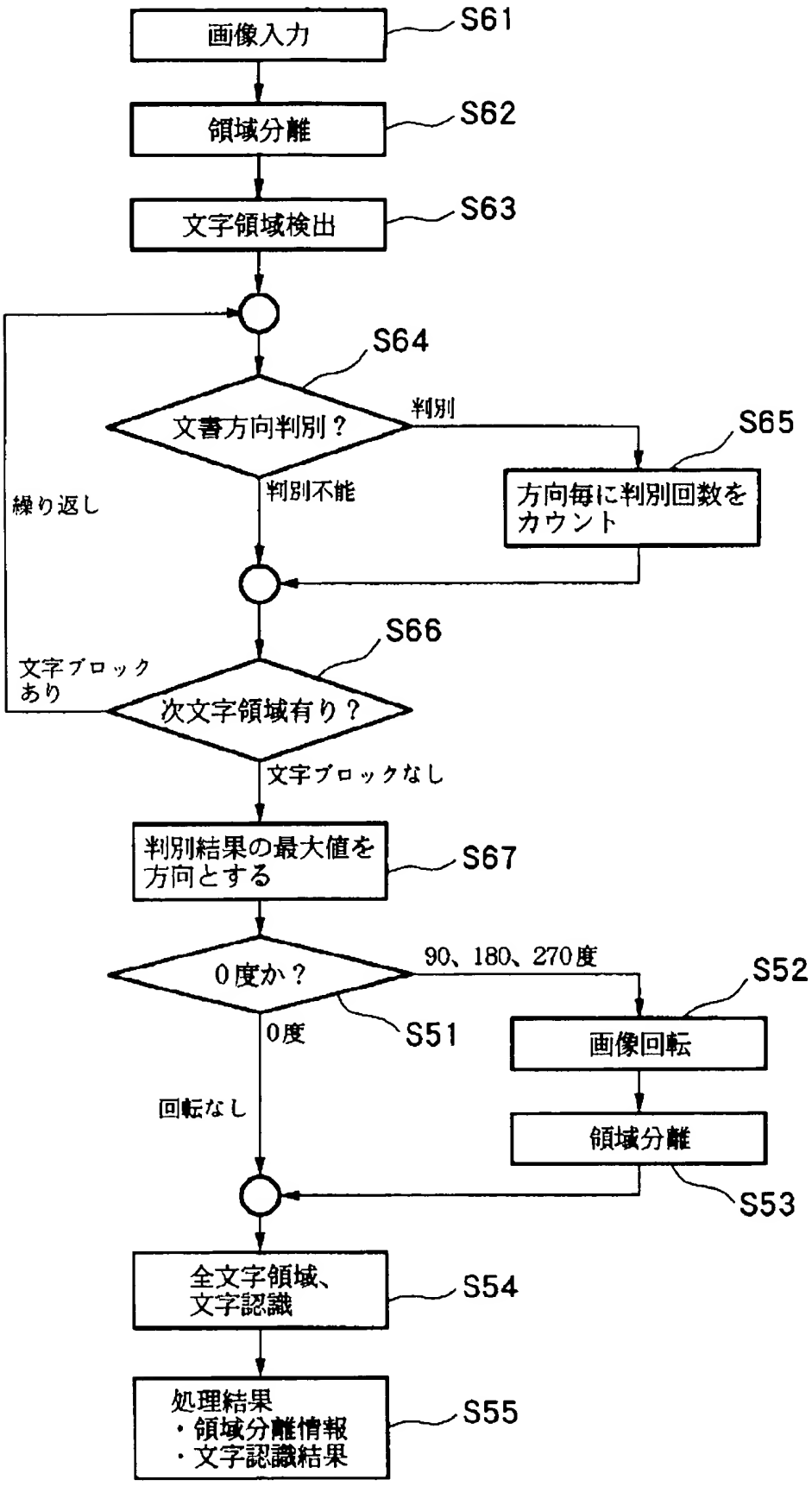
[Drawing 10]



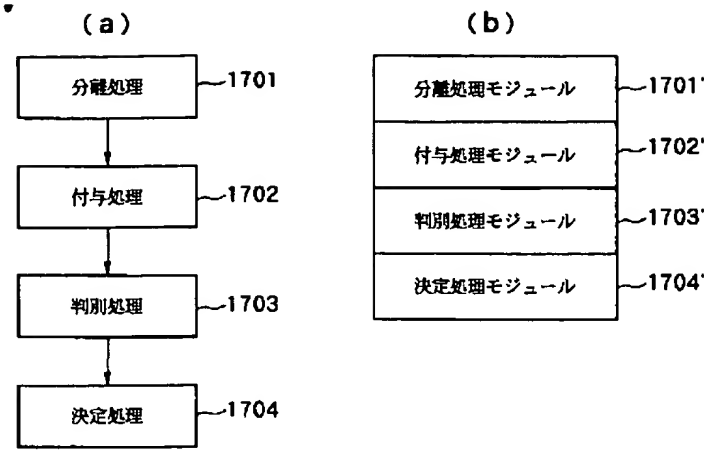
[Drawing 14]



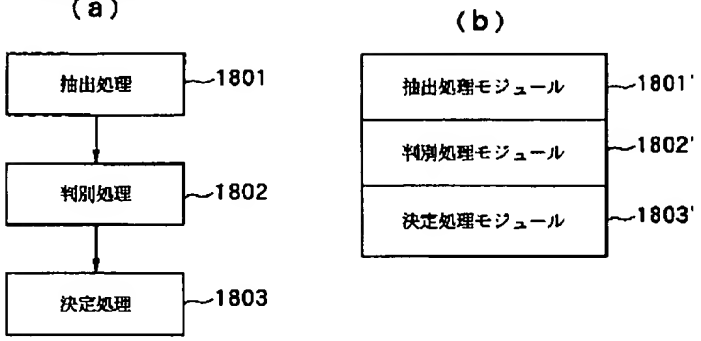
[Drawing 11]


画像入力
S61
領域分離
S62
文字領域検出
S63
S64
文書方向判別？
判別
S65
方向毎に判別回数をカウント
判別不能
繰り返し
S66
文字ブロックあり
次文字領域有り？
文字ブロックなし
判別結果の最大値を方向とする
S67
0度か？
90、180、270度
S52
S51
0度
画像回転
回転なし
領域分離
S53
全文字領域、文字認識
S54
処理結果
・領域分離情報
・文字認識結果
S55

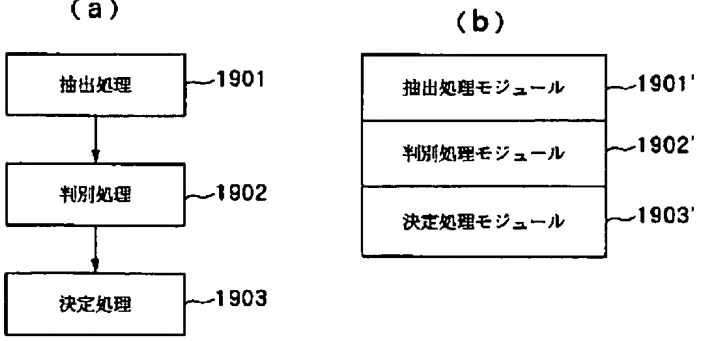
[Drawing 17]



[Drawing 18]



[Drawing 19]



[Translation done.]